

REMARKS

I. Claim Status

Claims 55 and 58 are currently pending. Claim 55 is amended herein for clarification, and to incorporate the subject matter of claims 56 and 57, now cancelled. No new matter is added by that amendment. Claims 1-54, 56, 57, and 59-61 have been canceled without prejudice.

II. Rejections under 35 U.S.C. § 112

Rejection under 35 U.S.C. § 112, first paragraph

Claims 55-58 have been rejected under 35 U.S.C. § 112, first paragraph for failing to comply with the written description requirement. To support that rejection, the Examiner asserts that the “disclosure has not shown possession of the entire scope of the claimed process of retaining or shaping hair.” Office Action at 3. Specifically, the Examiner claims that “there is no nexus between the identity of the components of the star copolymer and the properties required for use in this invention, namely, the ability to shape or retain hair.” *Id.* Applicant respectfully traverses this rejection.

Applicant submits that the specification fully complies with the written description requirement. In particular, the specification repeatedly links a star copolymer with its ability to shape or retain hair. For example, the specification discloses that the “highly specific” nature and “specific ordered structure” of the copolymers “make it possible to obtain a composition capable of being applied to keratinous fibres, in particular the hair, which can make possible suitable form retention of the hair while retaining ease of disentangling and a pleasant appearance of hair.” Specification at 2-3. In addition, “these copolymers overcome many of the problems identified for previous polymers [i.e.

not star copolymers] which were generally anionic, amphoteric or non-ionic film-forming polymers which result in the formation of films having a more or less hard or brittle nature." Specification at 1. Indeed, the composition, containing the star copolymers, made in accordance with the invention can be applied to dry or wet hair. Consequently, those compositions "find a very particular application as composition for treating or fixing hair." Specification at 28.

Moreover, the specification discloses at least one specific example of a star copolymer, the formation and identity of which are detailed, for example, in Example 1. Application of that composition to the hair produced "good styling power," "rapid drying time and good cosmetic properties, in particular with regard to disentangling and touch." Accordingly, Applicant submits that the present claims are fully supported by the written description.

For at least the reasons presented herein, this rejection should be withdrawn.

Rejection under 35 U.S.C. § 112, second paragraph

Claims 55-58 have been rejected under 35 U.S.C. § 112, second paragraph as "failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention." Office Action at 4. The Examiner asserts that the structure recited for the star copolymers is indefinite in that "the branch comprising at least one polymerized monomeric unit is not defined." Office Action at 4. To support that assertion, the Examiner cites three reasons for indefiniteness.

Applicant respectfully traverse the rejection and addresses each of these reasons below. Applicant also requests that the Examiner note that since Mk and Mj

are similarly defined except with respect to their Tg ranges, all arguments presented for Mk also apply to Mj.

First, the Examiner asserts that "when Mk includes two different units, there is no 'homopolymer formed by the corresponding monomeric units Mk', as recited." Office Action at 4. Applicant acknowledges that a homopolymer contains one repeating monomer unit. But the referenced homopolymer in claim 55 refers to a homopolymer formed from a single monomeric unit Mk. That homopolymer functions as a threshold test to define the Mk monomers that will be suitable Mi components. In other words, in order to qualify as an Mk monomeric unit that is suitable to synthesize a star copolymer, a homopolymer formed by said potential Mk unit must have a Tg of greater than or equal to 10°C. Therefore, the fact that Mk may define different monomeric units in the actual star copolymer does not create indefiniteness, because the homopolymer referred to in claim 55 refers to the homopolymers that are each composed of a single type of Mk monomeric unit.

Furthermore, composition or apparatus claims can be defined both in terms of their structure and their function. In fact, the M.P.E.P. indicates that it is not wrong to do so. The M.P.E.P. states:

There is nothing inherently wrong with defining some part of an invention in functional terms. Functional language does not, in and of itself, render a claim improper.

A functional limitation must be evaluated and considered, just like any other limitation of the claim, for what it fairly conveys to a person of ordinary skill in the pertinent art in the context in which it is used. A functional limitation is often used in association with an element, ingredient, or step of a process to define a particular capability or purpose that is served by the recited element, ingredient or step.

M.P.E.P. § 2173.05(g), Rev. 6, Sept. 2007.

Second, the Examiner indicates that, in claim 55, Mk is defined by the Tg of a homopolymer of Mk. The Examiner, relying on Montserrat et al, asserts that because “the claim does not state what the molecular weight of the homopolymer is when the Tg is measured, it is impossible for the artisan to know what is, and what is not, encompassed by Mk.” Office Action at 5.

However, claim 55 in view of the disclosure is definite. A person of ordinary skill would be able to determine what is and what is not encompassed by Mk because the specification defines a method for determining Tg. In particular, the specification provides that “[t]he Tg (glass transition temperature) is measured by DSC (Differential Scanning Calorimetry) according to ASTM Standard D3418-97.” Specification at 23. A copy of that procedure is enclosed for the Examiner’s convenience. Therefore, one of ordinary skill in the art would be able to determine monomeric units Mk within the claim scope by measuring the Tg of homopolymers of the potential Mk monomeric units in accord with the ASTM Standard D3418-97 protocol.

Finally, the Examiner asserts that “the terms M1, M2, p1 and p2 are used in the claim, but are not defined, nor are these terms known to the artisan.” Office Action at 5. Without conceding the propriety of this rejection, claim 55 has been amended herein to remove “M1,” “M2,” “_{p1},” and “_{p2}.” Therefore, this reason for rejection is rendered moot. For at least the reasons presented here, this rejection should be withdrawn.

III. Rejection under 35 U.S.C. § 102(b)

Rejection over Manning (5,552,137)

Claims 55 and 58 have been “rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,552,137 to Manning et al.” (“Manning”). Office Action at 5. Applicant respectfully submit that this rejection has been rendered moot by the incorporation of the limitations of claims 56 and 57 into claim 55. Claims 56 and 57 were not included in the rejection under 35 U.S.C. § 102(b) set forth by the Examiner. For this reason, Applicants request that this rejection be withdrawn.

IV. Double Patenting Rejection

Claims 55-58 have been rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over 1) claims 16-23 of U.S. Patent No. 6,737,071; 2) claims 1-5 of U.S. Patent 6,692,733; 3) claims 1-5 of U.S. Patent No. 6,723,789; and 4) claims 60-63 of U.S. Patent No. 6,476,124. Applicant respectfully requests that those rejections be held in abeyance until allowable subject matter is indicated in the present application. See M.P.E.P § 804(I)(B).

V. Conclusion

In view of the foregoing amendments and remarks, Applicant respectfully requests reconsideration of this application and the timely allowance of the pending claims.

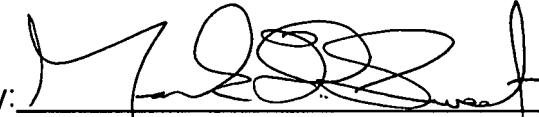
Please grant any extensions of time required to enter this response and charge
any additional required fees to our Deposit Account No. 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

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By:


Mark D. Sweet
Reg. No. 41,469

Attachments: ASTM D 3419-97 (4 pages)



Standard Test Method for Transition Temperatures of Polymers By Thermal Analysis¹

This standard is issued under the fixed designation D 3418; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense. Consult the DoD Index of Specifications and Standards for the specific year of issue which has been adopted by the Department of Defense.

1. Scope

1.1 This test method covers determination of transition temperatures of polymers (Note 1) by differential thermal analysis or differential scanning calorimetry.

NOTE 1—First-order transition temperatures or melting points of semicrystalline polymers may also be determined or approximated by the procedures found in Test Method D 2117 and Test Methods D 789.

1.2 This test method is applicable to polymers in granular form (below 60 mesh preferred, avoiding grinding if possible) or to any fabricated shape from which appropriate specimens can be cut.

1.3 The normal operating temperature range is from the cryogenic region to 600°C. With special equipment, the temperature range can be extended.

1.4 The values stated in SI units are to be regarded as the standard.

1.5 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety concerns associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

NOTE 2—To date, there is no similar or equivalent approved ISO standard.

2. Referenced Documents

2.1 ASTM Standards:

D 789 Test Methods for Determination of Relative Viscosity, Melting Points, and Moisture Content of Polyamide (PA)²

D 2117 Test Method for Melting Point of Semicrystalline Polymers by the Hot Stage Microscopy Method²

E 473 Terminology Relating to Thermal Analysis³

E 563 Practice for Preparation and Use of Freezing Point Reference Baths⁴

E 793 Test Method for Heats of Fusion and Crystallization by Differential Scanning Calorimetry³

E 794 Test Method for Melting and Crystallization Temperature by Thermal Analysis³

¹ This test method is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.30 on Thermal Properties (Section D20.30.07).

Current edition approved Jan. 10, 1997. Published May 1997. Originally published as D 3418 - 75. Last previous edition D 3418 - 82 (1988)¹.

² Annual Book of ASTM Standards, Vol 08.01.

³ Annual Book of ASTM Standards, Vol 14.02.

⁴ Annual Book of ASTM Standards, Vol 14.03.

E 967 Practice for Temperature Calibration of Differential Scanning Calorimeters and Differential Thermal Analyzers³

E 968 Practice for Heat Flow Calibration of Differential Scanning Calorimeters³

E 1142 Terminology Relating to Thermophysical Properties³

3. Terminology

3.1 Specialized terms used in this test method are defined in Terminologies E 473 and E 1142.

4. Summary of Test Method

4.1 The test method consists of heating or cooling the test material at a controlled rate in a controlled atmosphere and continuously monitoring with a suitable sensing device the difference in temperature or the difference in heat input between a reference material and a test material due to energy changes in the material. A transition is marked by absorption or release of energy by the specimen resulting in a corresponding endothermic or exothermic peak or baseline shift in the heating or cooling curve.

5. Significance and Use

5.1 Thermal analysis provides a rapid method for determining the temperature profile of a material. Transition temperatures can be determined in polymers that possess them. Commercial polymers or, in many cases, the components of a mixture may be identified by this test method. The results of chemical reactions that affect the transition can be studied with the aid of this technique; such reactions include oxidation, the curing of thermosetting resins, and thermal decomposition.

5.2 This test is useful for both specification acceptance and research.

6. Interferences

6.1 An increase or decrease in heating rate from those specified can alter the results. The presence of impurities will affect the calculated transition temperature, particularly if an impurity tends to form solid solutions, or to be miscible in the melt phase. Since particle size has an effect upon detected transition temperatures, the specimens to be compared should be approximately the same particle size (1 through 5).⁵

⁵ The boldface numbers in parentheses refer to the list of references at the end of this test method.

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6.2 In some cases the specimens may react with air during the temperature cycle, causing an incorrect transition temperature to be measured. Where it has been shown that this effect is present, provision shall be made for running the test under vacuum or an inert gas blanket. Since some materials degrade near the melting region, care must be used to distinguish between degradation and transition.

6.3 Since milligram quantities of a specimen are used, it is essential to ensure that specimens are homogeneous and representative.

6.4 Toxic or corrosive effluents, or both, can be released when heating the material, and could be harmful to the personnel or to the apparatus.

7. Apparatus

7.1 *Differential Thermal Analyzer or Differential Scanning Calorimeter*, capable of heating or cooling at rates up to at least $20 \pm 1^\circ\text{C}/\text{min}$ and of automatic recording of difference in temperature or in heat input between the specimen and a reference material, both to the required sensitivity and precision. Increasing the heating rate has been found to produce sharper transition curves. For comparison purposes, the same heating rate shall be used.

7.2 *Specimen Capsules*, composed of borosilicate glass, aluminum, or other metals of high thermal conductivity.

NOTE 3—The composition of some specimen capsules can affect the results when used with specific polymers.

7.3 *Thermocouple Reference Junction*, consisting of a stirred bath of ice/water slurry or electronic type.

7.4 *Reference Material*—Glass beads, alumina powder, silicon carbide, or any material known to be unaffected by repeated heating - cooling and free from interfering transitions. The thermal diffusivity of the reference should be as close as possible to those of the specimen.

NOTE 4—Reference materials for fiber samples may be fibrous.

7.5 *Recording Charts or Computer Analysis Software* for temperature-recording apparatus, with suitable graduations for measurement of either temperature differential or energy differential against temperature or time.

8. Sample

8.1 *Powdered or Granular Specimens*—Avoid grinding if the preliminary thermal cycle as outlined in 10.1.2 is *not* performed. Grinding or similar techniques for size reduction often introduce thermal effects because of friction or orientation, or both, and thereby change the thermal history of the specimen.

8.2 *Molded or Pelleted Specimens*—Cut the specimens with a microtome, razor blade, hypodermic punch, paper punch, or cork borer (size No. 2 or 3) to appropriate size, in thickness or diameter and length that will best fit the specimen capsule and will approximate the desired weight in the subsequent procedure.

8.3 *Film or Sheet Specimens*—For films thicker than 40 μm , see 8.2. For thinner films, cut slivers to fit in the specimen capsules or punch disks, if the circular specimen capsules are used.

9. Calibration

9.1 Calibration procedures for DSC are specified in Practices E 967 and E 968.

10. Procedure

10.1 *For First-Order Transition:*

10.1.1 Use a specimen mass appropriate for the material to be tested. In most cases 5 mg specimen mass is satisfactory. An appropriate specimen mass will result in 25 to 95 % scale deflection of the recording system when acceptable sensitivity is used. Avoid overloading. Weigh the specimen to an accuracy of 10 μg .

10.1.1.1 When differential thermal analysis is used, intimate thermal contact between the specimen and clean thermocouple or other temperature probe is essential for reproducible results. Use sample packing technique appropriate to the apparatus.

10.1.1.2 When differential scanning calorimetry is used, intimate thermal contact between the pan and specimen is essential for reproducible results. Crimp a metal cover against the pan with the sample sandwiched in between to assure good heat transfer. Take care to ensure flat pan bottoms.

10.1.2 Perform and record a preliminary thermal cycle by heating the sample at a rate of $10^\circ\text{C}/\text{min}$ under nitrogen atmosphere from ambient to 30°C above the melting point or up to a temperature high enough to erase previous thermal history. The selection of temperature and time are critical when effect of annealing is studied. Minimize the time of exposure to high temperature to avoid sublimation or decomposition. In some cases the preliminary thermal cycle may interfere with the transition of interest, causing an incorrect transition or eliminating a transition. Where it has been shown that this effect is present, omit the preliminary thermal cycle.

10.1.3 Hold temperature for 10 min (10.1.2).

10.1.4 Cool to 50°C below the peak crystallization temperature at a rate of $10^\circ\text{C}/\text{min}$.

10.1.5 Repeat heating (10.1.2) as soon as possible under nitrogen at a rate of $10^\circ\text{C}/\text{min}$, and record the heating curve.

10.1.6 Hold temperature for 10 min (10.1.3).

10.1.7 Repeat cooling (10.1.4) under nitrogen at a rate of $10^\circ\text{C}/\text{min}$, and record the freezing curve.

10.1.8 Measure the corrected temperatures for the desired points on the curves: T_f , T_m , T_c , T_e (see Fig. 1). Report two T_m 's if observed.

where:

T_f = extrapolated onset temperature, $^\circ\text{C}$,

T_m = melting peak temperature, $^\circ\text{C}$,

T_c = crystallization peak temperature, $^\circ\text{C}$, and

T_e = extrapolated end temperature, $^\circ\text{C}$.

NOTE 5—The actual temperature displayed on the temperature axis depends upon the instrument type (for example, specimen temperature, program temperature, specimen-program temperature average). Follow any recommended procedures or guidelines of the instrument manufacturer to obtain specimen temperature at the point of interest.

10.2 *For Glass Transition:*

10.2.1 Use a specimen mass appropriate for the material to be tested. In most cases 10 to 20 mg specimen mass is satisfactory. If both first- and second-order transitions are to

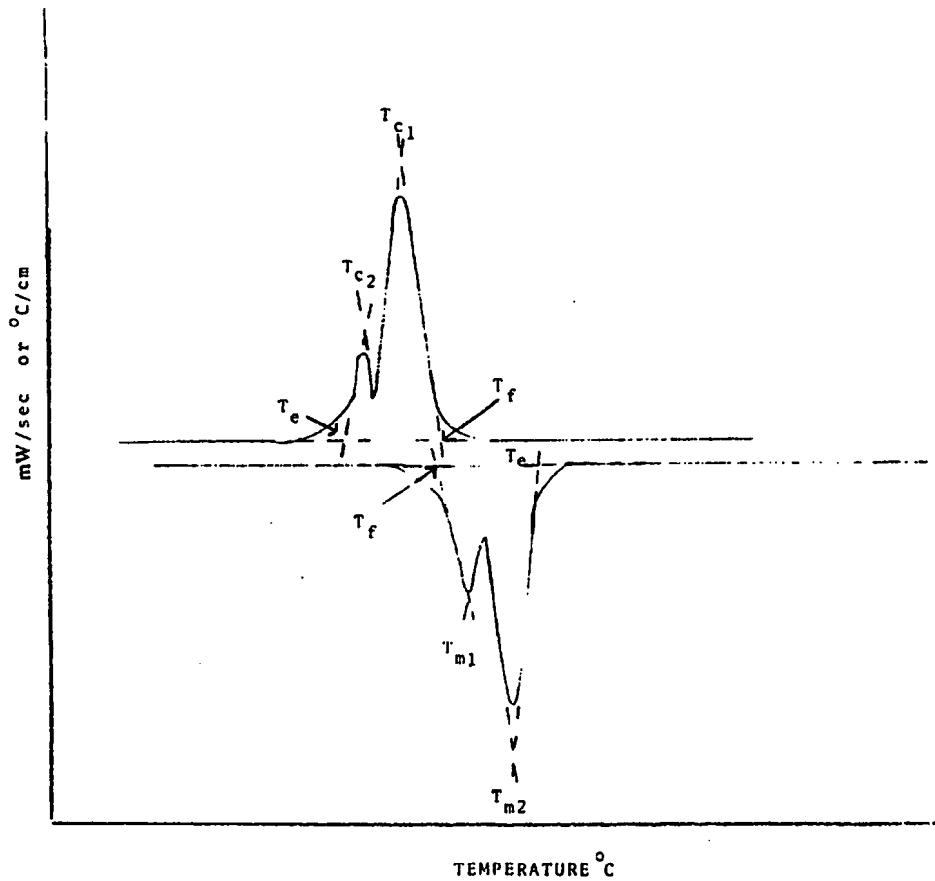


FIG. 1 First-Order Transition of Nylon

be determined, use a new specimen for each test. Weigh the specimen to an accuracy of 10 μ g.

10.2.2 Perform and record a preliminary thermal cycle (10.1.2) in air (or nitrogen) up to a temperature high enough to erase previous thermal history, heating at a rate of 20°C/min.

10.2.3 Hold temperature for 10 min.

10.2.4 Quench cool to 50°C below the transition temperature of interest.

10.2.5 Hold temperature for 10 min.

10.2.6 Repeat heating (10.2.2) at a rate of 20°C/min, and record the heating curve until all desired transitions have been completed.

10.2.7 Measure corrected temperatures T_f , T_g , T_e , T_m (see Fig. 2):

where

T_f = extrapolated onset temperature, °C,

T_g = glass transition temperature, °C,

T_e = extrapolated end temperature, °C, and

T_m = midpoint temperature, °C.

A new baseline will probably be established after the transition, rather than a peak. For most applications the T_f temperature is more meaningful and may be designated as the T_g temperature in place of the midpoint of the T_g curve.

11. Report

11.1 Report the following information:

11.1.1 Complete identification and description of the material tested, including source, manufacturer's code,

11.1.2 Description of instrument used for the test,

11.1.3 Statement of the dimensions, geometry, and materials of the specimen capsule; and the average rate of linear temperature change,

11.1.4 Description of temperature calibration procedure,

11.1.5 Identification of the sample atmosphere by pressure gas flow rate, purity and composition, including humidity, if applicable,

11.1.6 Results of the transition measurements using the temperature parameters (T_m , etc.) cited in Fig. 1, or any combination of parameters suitable for the purpose in hand. T_m and T_f are commonly used as single characteristic temperatures for the first-order transition of semicrystalline polymers but must be identified by including the subscript, and,

11.1.7 Any side reaction (for example, crosslinking, thermal degradation, oxidation) shall also be reported, and the reaction identified if possible.

12. Precision and Bias

12.1 This test method does not yet contain a numerical precision and bias statement, and it shall not be used as a referee test method in case of dispute. The precision and bias of this test method are under investigation by a task group of Subcommittee D20.30 (Section D20.30.07). Anyone wishing to participate in this work may contact the Subcommittee or

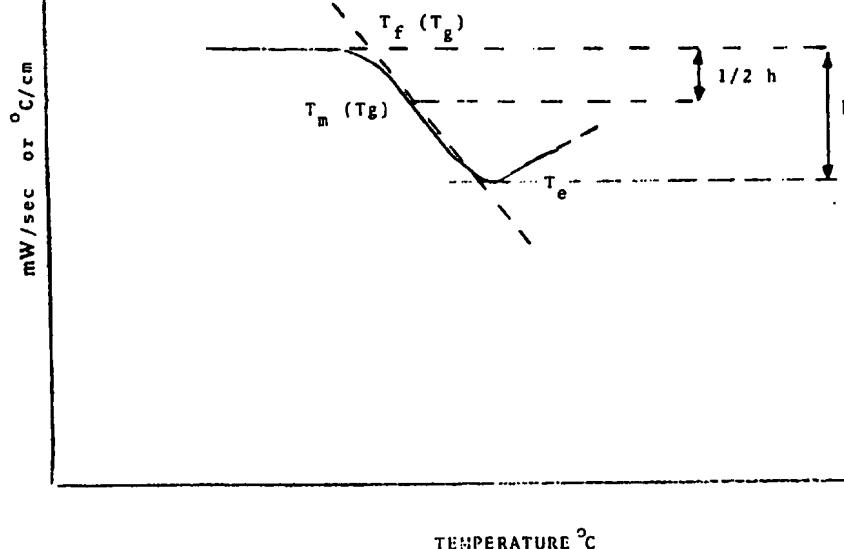


FIG. 2 Assignment of Glass Transition of Poly(Methyl Methacrylate) (PMMA)

Section chairman through ASTM Headquarters.

13. Keywords

13.1 assigned glass transition; controlled atmosphere; dif-

ferential scanning calorimetry (DSC); differential thermal analysis; first-order transition; polymer; transition temperature

REFERENCES

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